

## CALLOPHRYS (MITOURA) SPINETORUM AND C. (M.) JOHNSONI:

Their known range, habits, variation, and history

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THE PURPOSE OF THIS STUDY was primarily to record the known distribution of *M. spinetorum* (Hewitson) and *M. johnsoni* (Skinner). Correspondence furnished most of the records. There is probably little danger of misidentification of *spinetorum* since it is widely known from the descriptions and illustrations in Comstock (1927) and Holland (1931) and since it is a distinctive hairstreak. However, it was necessary to see *johnsoni* specimens wherever possible or have someone familiar with *johnsoni* make the identification since there is definitely misunderstanding about what the name represents. *M. nelsoni* and *spinetorum* have occasionally been misidentified as *johnsoni*. For example, Jones (1951) records a *johnsoni* from Spuzzum, British Columbia, that turned out upon examination to be *nelsoni*. Also, a "*spinetorum* near *johnsoni*" from Wilson, Wyoming (Nabokov, 1950), proved to be *spinetorum*. Similarity of facies and of foodplant preference (*Arceuthobium*) leads one to believe that *spinetorum* and *johnsoni* are closely related.

### HISTORY

*M. spinetorum* was described by Hewitson in 1867 from one female collected somewhere in California by Lorquin. The type is in the United States National Museum collection. W. H. Edwards described *M. ninus* in 1871 from three males collected by Mead in Colorado. Mead caught the specimens "on the South Park road, four miles from the park, on the 17th of June [1871]", as stated in the Report of the Wheeler Expedition, Zoology, p. 778 (Brown, 1955). This locality is today found ca. 1 mi. E Kenosha Pass summit, U. S. Highway 285, according to Brown (1955). Two of the three *ninus* "types" are in the Carnegie Museum, one of which was designated the lectotype by F. M. Brown in 1965. *M. cuyamaca* was described by W. S. Wright in

1922 from Julian, San Diego Co., Calif. (VIII-4-17, holotype female). I do not know where this specimen is located; it is not in the San Diego Natural History Museum collection. The allotype male of *cuyamaca*, from Cuyamaca Lake, San Diego Co., Calif., VII-7-18, is in the SDNH Museum collection; it is labelled "*Strymon cuyamacha* Type. Wright." It is unfortunate that this specimen is missing antennae and abdomen. A *cuyamacha* paratype from Julian is located in the USNM and is labelled "*cuyamacha*"; the whereabouts of the other four paratypes is unknown. *M. johnsoni* was described by Skinner in 1904 from a female from British Columbia and a male from Seattle, Wash. (ex larva, emerged VII-15-91, leg. C. V. Piper). The types are located in the Carnegie Museum collection.

### DISTRIBUTION

In California *spinetorum* is found from near sea level (Monterey Peninsula, Monterey Co., leg. J. C. Spencer) to 8000 feet (Mineral King, Tulare Co., leg. E. Pfeiler). In Colorado it flies from about 6200 feet (Soda Spring, Boulder Co., leg. D. Eff) to 11,000 feet (Squaw Mtn. Meadow, Clear Creek Co., leg. R. J. Jae). The northernmost record is Young Lake, B. C. (leg. W. E. Bitz), and the southernmost record is 6 mi. E. Mexico-Michocan boundary on hiway 45, Mex. (leg. F. G. Hawksworth & D. Wiens). The westernmost record is Cobb, Lake Co., Calif. (leg. F. Cobb, Jr.), and the easternmost record is the above mentioned Mexican locality (the easternmost U. S. record being Star Ranch, El Paso Co., Colo., leg. S. A. Johnson). Since the distribution picture reflects a collecting bias, I should point out that *spinetorum* may turn up where *Arceuthobium* is known to occur in much of Mexico, Guatemala, northern coastal California, extreme western Texas, Vancouver Island, central British Columbia, southeastern Alaska, Alberta, Saskatchewan, Manitoba, north-eastern United States, and southeastern Canada. North American host trees for *Arceuthobium* are all in the family Pinaceae (Kuijt, 1960).

The "Laguna, California" label for the *spinetorum* figured in Ehrlich & Ehrlich (1961) is most likely Laguna Mtns., San Diego Co., Calif. The figured specimen was captured by G. Field who collected in San Diego Co. during that time (1926). One pair in the AMNH labelled "Laguna, Orange Co., Calif., VI-16-26, leg. C. Henne" probably represents a mislabelling because Mr. Henne was not collecting then and furthermore Laguna Beach, Orange Co., is rather distant from any native stand of pines.

## VARIATION

Measurements of two *spinetorum* populations were taken (see tables 1, 2). The linear length of the right primary, from costa base to apex, and the length of the thoracic tergum, from anterior edge to posterior point, were measured on spread specimens with a vernier caliper. The ratio of wing length to tergum was used to help minimize differences due to size, although a possible error may be introduced from terga warped by "papering". At the 5 per cent level, the probability that the difference between Rollinsville and Laguna Mtns. populations is due to chance alone is less than 0.001, except for  $P = .10+$  in the male ratio. A significant difference was also found between 1960 and 1964 female

TABLE 1 MALE SPINETORUM

| Locality                             | No. | Mean wing length<br>(mm)                  | Range (mm) | S.D. | S.E. | d     | P     |
|--------------------------------------|-----|-------------------------------------------|------------|------|------|-------|-------|
| Rollinsville,<br>Colo. 8400'         | 34  | 13.573                                    | 11.4-14.6  | .665 | .114 | 9.46  | .001- |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 41  | 14.982                                    | 13.8-16.1  | .607 | .095 |       |       |
| Locality                             | No. | Mean tergum<br>length (mm)                | Range (mm) | S.D. | S.E. | d     | P     |
| Rollinsville,<br>Colo. 8400'         | 34  | 4.314                                     | 3.2-4.9    | .351 | .060 | 10.45 | .001- |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 41  | 5.056                                     | 4.5-5.8    | .324 | .051 |       |       |
| Locality                             | No. | Mean ratio of<br>wing length to<br>tergum | Range      | S.D. | S.E. | d     | P     |
| Rollinsville,<br>Colo. 8400'         | 34  | 3.16                                      | 2.90-3.80  | .783 | .134 | 1.40  | .10+  |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 41  | 2.97                                      | 2.65-3.30  | .138 | .022 |       |       |

S.D. = Standard deviation; S.E. = Standard error; P = Probability

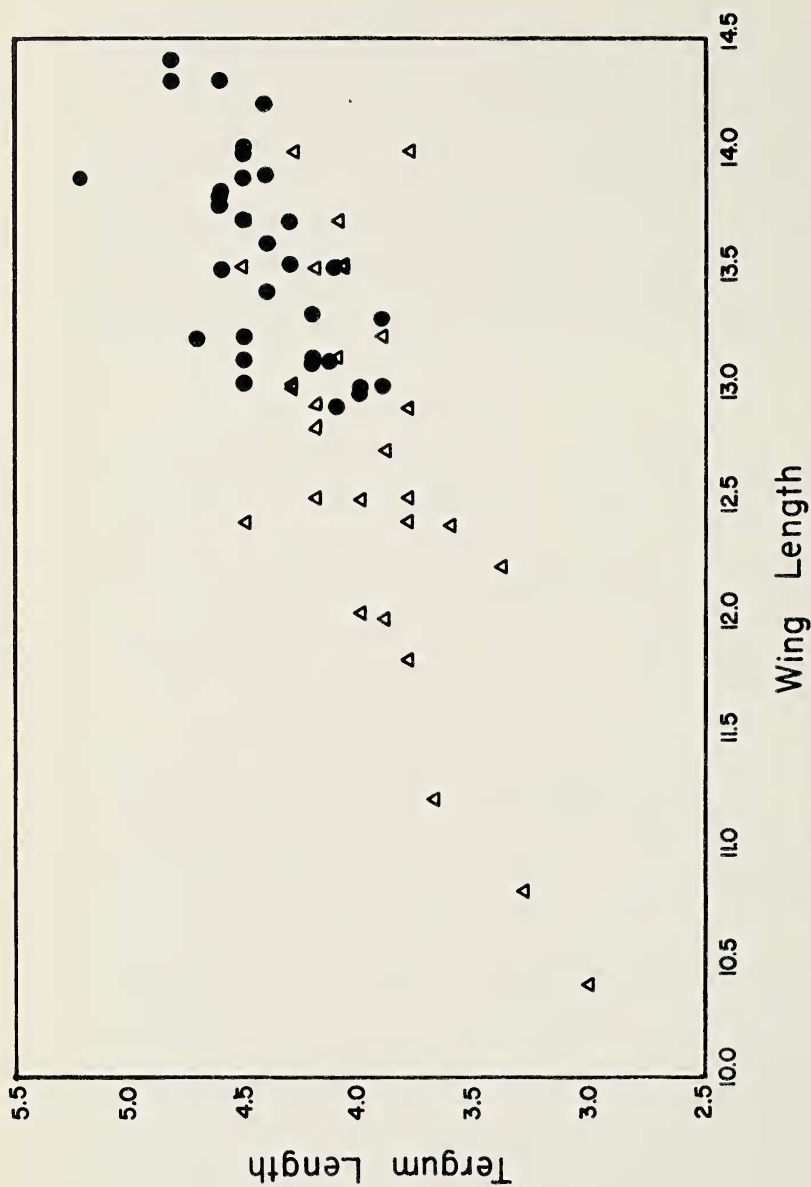


Fig. 1. The relationship between wing length and tergum length in *spinetorum* populations at Rollinsville, Colorado. + = June 14, 1960; 0 = June 23, 1964.



samples of the same spatial population (see table 3 & fig. 1). The summer of 1959, when the 1960 *spinetorum* June crop probably would be feeding, was unseasonably dry in the Colorado Rockies, while the summer of 1963 was unseasonably wet. These weather differences may have affected the size of the specimens in some way, although the evidence is circumstantial and perhaps too general.

### HABITS

Larvae of *spinetorum* were first located on *Arceuthobium campylopodum* Engelm. by C. Henne in 1936 (Comstock & Dammers, 1938). Remington (1958) recorded two additional food plants: *Arceuthobium vaginatum* f. *cryptopodum* (Engelm.) Gill, on *Pinus ponderosa* Laws. (leg. F. G. Hawksworth); and *A. americanum* Nutt. ex Engelm., on *P. contorta* Dougl. ex Loud. (leg. T. E. Hinds). Reared adults were obtained. Tilden (1960) reared an adult from a larva found on *A. campylopodum*, on *P. sabiniana* Dougl. ex Don (leg. W. S. Ross). Other host plant records for larvae include the following: *A. campylopodum*, on

TABLE 2 FEMALE SPINETORUM

| Locality                             | No. | Mean wing length<br>(mm)                  | Range (mm) | S.D. | S.E. | d     | P                 |
|--------------------------------------|-----|-------------------------------------------|------------|------|------|-------|-------------------|
| Rollinsville,<br>Colo. 8400'         | 78  | 13.311                                    | 10.4-14.8  | .808 | .091 | 16.03 | .001 <sup>-</sup> |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 109 | 14.994                                    | 13.5-16.4  | .599 | .058 |       |                   |
| Locality                             | No. | Mean tergum<br>length (mm)                | Range (mm) | S.D. | S.E. | d     | P                 |
| Rollinsville,<br>Colo. 8400'         | 78  | 3.711                                     | 2.5-4.7    | .359 | .041 | 24.72 | .001 <sup>-</sup> |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 109 | 4.502                                     | 3.8-5.3    | .277 | .027 |       |                   |
| Locality                             | No. | Mean ratio of<br>wing length to<br>tergum | Range      | S.D. | S.E. | d     | P                 |
| Rollinsville,<br>Colo. 8400'         | 78  | 3.60                                      | 2.95-4.25  | .257 | .029 | 5.91  | .001 <sup>-</sup> |
| Laguna Mtns.,<br>Calif. ca.<br>5500' | 109 | 3.34                                      | 2.85-3.80  | .485 | .047 |       |                   |

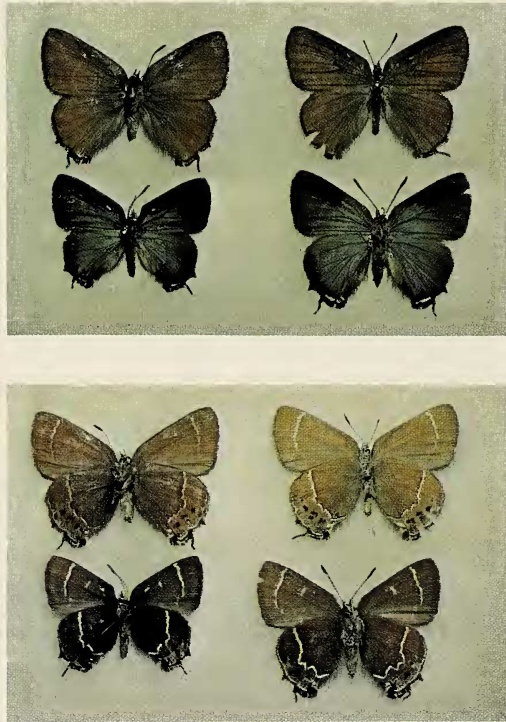


Fig. 2. Plate showing color differences between two populations of *johnsoni* and *spinetorum* females. Average specimens were selected from series for freshness. Upper four, upper side; lower four, lower side. 1. *M. johnsoni*, 1 mi. E Bassets, Sierra Co., Calif., 5460', VI-17-61 (P. A. Opler). 2. *M. johnsoni*, Jerseydale, Mariposa Co., Calif., 3800', VII-24-63 (O. Shields). 3. *M. spinetorum*, Rollinsville,, Gilpin Co., Colo., ca. 8400', VI-23-64 (J. A. Justics). 4. *M. spinetorum*, Boiling Springs, Laguna Mts., San Diego Co., Calif., 5500', VI-24-61 (F. T. Thorne). The under side brown of 1 and 4 is rust, linoleum for 2, and liver for 3; colors compared with the Reinhold Color Atlas.

*P. jeffreyi* Grev. & Balf. (leg. J. C. Downey, J. F. & T. C. Emmel, O. Shields); *A. c. F. abietinum* (Engelm.) Gill, on *Abies concolor* (Gord & Glend.) Lindl. ex Hildebr. (leg. O. Shields); \**A. c. F. blumeri* (A. Nels.) Gill, on *P. reflexa* Engelm. (leg. F. G. Hawksworth, P. C. Lightle); \**A. c. F. cyanocarpum* (A. Nels.) Gill, on *P. aristata* Engelm. (leg. F. G. Hawksworth, P. C. Lightle); *A. c. F. divaricatum* (Engelm.) Gill, on *P. monophylla* Torr. & Frem. (leg. O. Shields); \**A. c. F. laricis* (Piper), Gill on *Abies lasiocarpa* (Hook.) Nutt. (leg. E. F. Wicker, J. Grant); \**A. c. F. laricis*, on *Larix occidentalis* Nutt. (leg. E. F. Wicker); and \**A. globosum* Hawksworth & Wiens, on *P. michoacana* Martinez (leg. F. G. Hawksworth, D. Wiens). (Larvae not reared to adults = \*.) J. W. Tilden collected a female scared up from *Phoradendron* on *Juniperus* at Oak Creek Canyon, Ariz., but no evidence of larvae feeding on *Phoradendron* is yet available (pinyon also occurs in the vicinity).

TABLE 3 FEMALE SPINETORUM, ROLLINSVILLE, COLORADO

| Date         | No. | Mean wing length<br>(mm)                  | Range (mm) | t    | P     |
|--------------|-----|-------------------------------------------|------------|------|-------|
| 14 June 1960 | 26  | 12.634                                    | 10.4-14.0  | 5.18 | .001~ |
| 23 June 1964 | 32  | 13.546                                    | 12.9-14.4  |      |       |
| Date         | No. | Mean tergum<br>length (mm)                | Range (mm) | t    | P     |
| 14 June 1960 | 26  | 3.430                                     | 2.5-4.0    | 5.91 | .001~ |
| 23 June 1964 | 32  | 3.903                                     | 3.4-4.7    |      |       |
| Date         | No. | Mean ratio of<br>wing length to<br>tergum | Range      | t    | P     |
| 14 June 1960 | 26  | 3.70                                      | 3.37-4.24  | 3.74 | .001~ |
| 23 June 1964 | 32  | 3.48                                      | 2.96-3.91  |      |       |

Larvae of *johnsoni* were found on *Arceuthobium campylopodum* f. *tsugensis* (Rosendahl) Gill on *Tsuga heterophylla* (Raf.) Sarg. by C. V. Piper (Skinner, 1904), and larvae and egg shells were found by D. V. McCorkle on *tsugensis*. Adults were successfully reared. As pointed out by McCorkle (1962), the dwarf mistletoe given in Skinner's *johnsoni* type description was probably not *A. douglasii* Engelm. on *Tsuga mertensiana* (Bong.) Sarg. *Tsugensis* is not known to occur at least in several low-elevation California localities, indicating choice of another food-plant.

*Spinetorum* nectar sources recorded by contributors include *Achillea*, *Allium*, *Anaphalis*, *Antennaria*, *Aplopappus*, *Arctostaphylos*, *Berberis*, *Ceanothus*, *Cymopterus*, dandelion, *Erigeron*, *Eriodictyon*, *Eriogonum*, *Helenium*, *Iris*, *Lomatium*, *Lupinus*, *Polygonum*, *Potentilla*, *Prunus*, *Ribes*, *Rhus*, *Salix*, *Sambucus*, *Senecio*, *Solidago*, *Spraguea*, and thistle. *Johnsoni* sources include *Arctostaphylos*, *Ceanothus*, *Cornus*, dandelion, *Fragaria*, *Rorippa*, and *Spraguea*. Apparent "hilltopping" of male *spinetorum* was seen on a peak top in the Providence Mtns., Calif., and Black Ridge, Colo. (T. C. & J. F. Emmel). Both sexes of *spinetorum* and *johnsoni* are drawn to moisture at various localities. Most Colorado *spinetorum* records are for flowers, while most *spinetorum* specimens in the Laguna Mts., Calif., are taken at moisture and are only occasionally seen on flowers.

Remington (1958) mentioned an unidentified braconid larval parasite and a braconid pupal parasite (an undescribed *Apanteles*) of *spinetorum*. A tachinid larval parasite, *Masphyomyia paralis* Rein, was identified by C. W. Sabrosky; the fly pupates outside the *spinetorum* pupa. Larvae parasitized by *M. paralis* were collected nr. Ackerson Meadow, Tuolumne Co., Calif. (O. Shields), and one larva was collected from Warner Hot Springs Mtn., San Diego Co., Calif. (A. Forbes). A tetrastichid, *Tet astichus* ssp., identified at the USNM, was reared from *spinetorum* pupae from Kingsbury Grade, Douglas Co., Nev., by T. C. Emmel. Several dead *spinetorum* larvae and one *johnsoni* larva have been found with a parasite exit hole. *Spinetorum* adults occasionally have clipped wings and beak-marked wings, indicating bird predation.

#### ACKNOWLEDGEMENTS

The tremendous cooperation of many individuals during this study was most gratifying. Unfortunately, space precludes mention of all of the contributors, but those who sent records whose names are not mentioned in the record section include A. E.

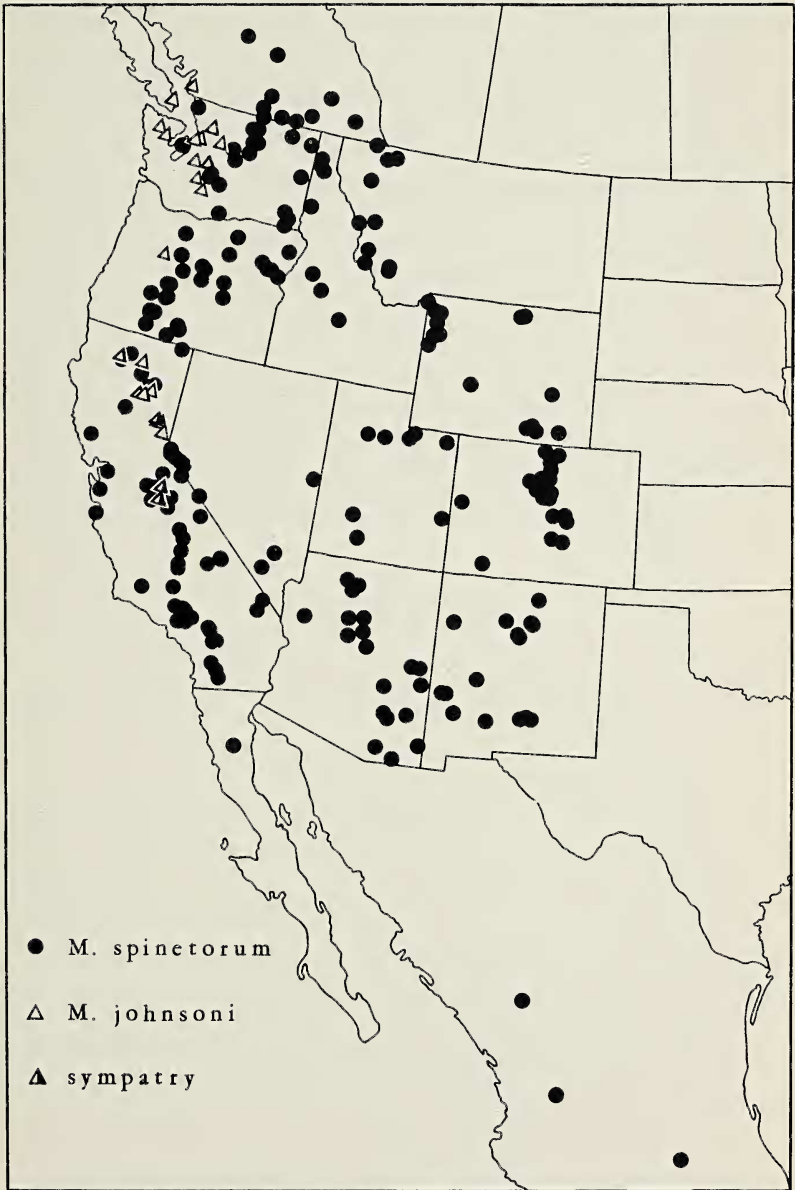


Fig. 3. Map showing distribution of *Mitoura spinetorum*, *M. johnsoni* and zones of sympatry.



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## APPENDIX

## LOCALITY DATA

C. (M). SPINETORUM

(\*= adults not reared)

## CANADA.

BRITISH COLUMBIA. Cranbrook, VI-27-?, 1♀ (AMNH). Fairview, 2 mi. SW Oliver, VI-12-19, 2♀ (W. B. Anderson, USNM and UBC). Fife, nr. Christina Lake, VIII-4-59, \*4 larvae (J. Grant). Jewel Lake, nr. Greenwood, VI-25-58, \*3 larvae (J. Grant). Kaslo, ?-?-02 (J. W. Cockle, CNM). Keremeos, V-27-34; V-12-36 (both A. N. Gartrell, CNM). Keremeos Crk., V-25-?, 1♂ (UBC). Osoyoos, V-21 to 24-? (J. K. Jacob, CNM). Penticton, VI-15-18, 1♀; VI-7-19, 1♂ 1♀; V-24-21 (all W. B. Anderson, CNM, UBC, USNM). Robson, IV-19-39, 1; V-26-46, 2; V-14-49, 1 (all H. R. Foxlee). Shingle Crk. Rd., Keremeos, V-19 to VI-19-33, "series" (A. N. Gartrell, CNM). Squalix, VIII-13-46, 1 larva (S. H. Farris). Summerland, Garnett Valley, V-28-? (CNM). Young Lake, nr. Clinton, VII-20-56, 1 larva (W. E. Bitz). Locality undetermined: Vasseau, VII-14-20 (W. B. Anderson, CNM).

Kaslo Cr., 1♀ (USNM)

## MEXICO.

BAJA CALIFORNIA. On trail into La Encantada, Sierra San Pedro Martir, 7000', V-30-58, 1♀ (J. A. Powell, in Patterson and Powell, 1959). DURANGO. Palos Colorados, 8000', VIII-6-47, 1♂ (C. D. Michener, AMNH). JALISCO. Bolaños, 1♀ (Richardson, BMNH, in Godman and Salvin, 1901). MEXICO. 6 mi. E Mexico-Michoacan boundary on highway 45, III-25-63, \*1 larva (F. G. Hawksworth, D. Wiens, PM).

## UNITED STATES OF AMERICA.

ARIZONA. Apache County: N. Fork of White River, 5 mi. SE McNary, VI-25-60 (K. Roever), N. Fork of White River, 7 mi. S McNary, VI-25-60, 1♂ (K. Roever); VII-4-59, 1♂ (W. Patterson). Greer, White Mtns., VI-17-54, 1♂ (C. W. Kirkwood, LACM). Horseshoe Cienega, 12 mi. E McNary, VI-26-60 (K. Roever). McNary, VI-21-42, 1♂ (E. R. Hulbirt). 2 mi. S McNary, VI-6-60 (K. Roever). Trout Crk. Rd., 12 mi. SE McNary, VII-4-59 (K. Roever). Trout Crk. Rd., 7 mi. S Smith Park, VI-25-60, 1♂ (K. Roever). White River nr. McNary, VIII-5-48, 1♀ (D. L. Bauer). Cochise County: Chiricahua Mtns., VI-8 to 15-?, 3♀; VI-16 to 23-?, 2♂ 2♀; VI-24 to 30-?, 1♂ 1♀; VII-1 to 7-?, 1♀ (all in USNM); VI-17 to 18-16, 1♂ 5♀ (W. W. Owen, LACM, in Comstock, 1927); V-23-34, 1♂ (J. A. Comstock, LACM); V-24-34, 1♂ (G. H. and J. L. Sperry, AMNH). Huachuca Mtns., V-2-?, 2♂ 1♀; VII-?-?, 1♂ (both USNM). Morris Canyon, Chiricahua Mtns., 5400', VI-12-06, 2♀ (V. W. Owen, LACM). Onion Saddle, Chiricahua Mtns., IX-2-51, 1♂ (C. D. MacNeill, CIS). Ramsey Canyon, Huachuca Mtns., VI-10-37, 2♂ 2♀ (J. L. Creelman, SDNH); 1♀ (J. L. Creelman); 1♂ (AMNH). 1 mi. W Reef, Huachuca Mtns., VII-5-62, "larvae" (F. G. Hawksworth, P. C. Lightle). Nr. Rustler Park, Chiricahua Mtns., VI-5-55, 1 (J. C. Spencer). Rustler Park, Chiricahua Mtns., 8700', VI-14-58, 1♂; VI-17-58, 4 (both C. D. MacNeill, CAS). Rustler Park, Chiricahua Mtns., VI-21-32, 6♂ 2♀ (E. R. Hulbirt); VII-4-51, 1♀ (D. L. Bauer); V-8-53, 3 (V. Nabokov, CU); V-28-58 (W. J. Reinthal); V-11-62, 1♂ (W. Gertsch, AMNH). Vicinity of Southwest Research Station, Chiricahua Mtns., IV-27-62, 1♂ (C. W. Kirkwood). E. Turkey Crk. Canyon, Chiricahua Mtns., 6400', IV-15-60, 1♂ (K. Roever, W. Patterson). Coconino County: Bill Williams Mtn., VIII-1-59, 1 (W. N. Burdick, UC). 6 mi. N Flagstaff, 7300', VI-27-62, 1♀ (F. T. Thorne). 10 mi. N Flagstaff on Ski Bowl Rd., VI-27-62, 1♂ (W. A. Hedges). Fort Valley Exp. For., ca. 9 mi. NW Flagstaff, ca. 7500', VII-15 to VIII-15, '56 and '57, ca. 24 larvae (F. G. Hawksworth, in Remington, 1958). Fremont Saddle Road, 6 mi. N Schultz Pass Road, San Francisco Peaks, "larvae" (F. G. Hawksworth, P. C. Lightle). Grand Canyon, V-27-33, 1♀ (D. K. Duncan, AMNH). Hermit Basin, S. Rim Grand Canyon, 5250', VI-4-42, 3♂ 1♀ (J. S. Garth, in Garth, 1950). Mather Point, S. Rim Grand Canyon, V-26-60, 1♂ (K. Roever). Neal Spring, N. Rim Grand Canyon, VI-14-56, 1 (V. Nabokov, CU). Oak Creek Canyon, VIII-12-45, 1♀ (D. L. Bauer); Lower part, VII-12-53, 1♀ (J. W. Tilden). Pima Point, Grand Canyon, V-25-60, 1♀ (K. Roever). Nr. Schultz Pass, San Francisco Pks., VI-6-51, 2♀ (D. L. Bauer). Schultz Pass, 8000', VI-7 to 8-59; V-27-60; VI-14-64 (all K. Roever). Schultz Pass, 7 road mi. NW Flagstaff, 7800', VI-12-63, 3♂ 6♀ (F. T. Thorne). Snow Bowl, San Francisco peaks, 9000', VI-23-62 (K. Roever). Swamp Ridge, N. Rim Grand Canyon, 7500-7750', VII-16-47, 1♂ (J. S. Garth, in Garth, 1950). Ca. 4 mi. S Williams, Kaibab Nat'l For., ca. 7000', VI-20-64, "1 larva (F. G. Hawksworth, in Remington, 1958). Yavapai Point, S. Rim Grand Canyon, 7000', VI-3-42, 1♂ (J. S. Garth); VII-12 to 18-44 (L. Schellbach, in Garth, 1950). Gila County: Pinal Mtns., IX-15-47, 1♂ 1♀ (D. L. Bauer). Pine, VII-10-58, "several" (J. W. Tilden). 7 mi. NE Strawberry, VI-12-60 (K. Roever). Graham County: Swift Trail, 1 mi. E Twilight Canyon, cal. 7000', VII-10-64, 1♀ (K. Roever). Greenlee County: Hannagan Meadows, Blue Range, VI-?-?, (R. H. T. Mattoni); VII-1-33, 1♀; VII-12-52, 1♂ (both E. R. Hulbirt). K. P. Cienega Forest Camp, Blue Range, 9300', VI-14-63, 1♀ (O. Shields). Rt. 666, 2 mi. S K. P. Cienega, VII-1-62 (K. Roever). Mohave County: 12 mi. S Kingman, Hualapai Mtns., 6000', VII-6-54, 4♀ (O. E. Sette). Pima County: Redington, 1♂ (USNM). Santa Catalina Mtns., V-10-03, 1 (Oslar, CM); V-25-37, 1♂ (O. Bryant, CAS). Pinal County: Peppersauce Canyon, V-18-33, 1♀ (G. H. and J. L. Sperry, AMNH). Santa Cruz County: Daly Mine Trail, Madera Canyon, Santa Rita Mtns., 6200', VII-13-60, 1♀ (K. Roever). Yavapai County: Jerome water tanks, IV-13-51, 2♀ (D. L. Bauer). 1/2 mi. S Musinus Mtn. Inn, VI-3-59 (K. Roever). County undetermined: Paradise Crk., White Mtns., 8500', VI-7-?, 1 (D. K. Duncan, CU). South Arizona, 2♀, 1♀ (Poling, BMNM and CAS). White Mtns., VI-9-?, 1 (CU); VI-19-?, 1 (CU); VI-7-33, 1♂ 3♀ (D. K. Duncan, AMNH); VI-6-34, 1♀ (D. K. Duncan); VI-18-35, 2♀; VI-19-36, 1♂ (both G. H. and J. L. Sperry, AMNH); VII-1-41, 1♂ (AMNH); VI-16-47, 1♂; VII-4-51, 2♂; VI-10-53, 1♂ (last 3 E. R. Hulbirt); 8900', VI-14-47, 1♂ 3♀ (D. B. Stallings, J. R. Turner).

Apache County: Alpine Divide, VI-27-65, 1♀ (J. Scott). Coconino County: Pinal Point, Grand Canyon, VI-24-65, "seen", J. Scott; 2 mi. SW Sunset Crater Nat. Mon. turn off, VI-25-65, 1♀ (J. Scott).

CALIFORNIA. Amador County: 1.4 mi. E Round Valley, W Silver Lake, highway 88, VI-28-60, 1 (N. La Due). Calaveras County: Camp Wolfeboro, N. Fork Stanislaus River, 5600', VII-2-53, 1♂ (P. Opler). Contra Costa County: Mt. Diablo, IV-2-49, 1♂ (R. P. Allen, CAS). Russelman Park, Mt. Diablo, V-16-59, 1 larva (E. S. Ross, in Tilden, 1960). Inyo County: Argus Mtns., IV-?-? (CM); IV-?-? 91, 3♂ (Koebele, CAS and USNM). Telescope Peak, VI-24 to 25-30, 1♀ (AMNH). Westgard Pass, VII-28-54, 1♀ (J. A. Powell, CIS). Wildrose Canyon, Panamint Mtns., VII-4-40, 1♂ + 1 (C. Henne). Kern County: Nr. Alta Sierra, 11 mi. W Kernville, VI-10-61, 1♀ (R. E. Stanford). Road to Double Mtn., 5000-



6000', VI-22-64, 1 (N. La Due). Frazier Park, 7 mi. W highway 99 (E. R. Hulbirt). W end Frazier Park, V-17-61, 1q (N. La Due). 2 mi. W Frazier Park, VII-12-57, 2♂ (P. Opler). Greenhorn Mtns., VI-28-30, 1♂ (J. S. Garth); VII-5-33, 1♂ (CIS); VII-1-40, 1q (L. M. Martin, LACM); VI-24-61, 1 (R. E. Stanford and K. Hughes). Greenhorn Mtns., 29 mi. NE Bakersfield, 5600', VI-12-57, 1q (O. E. Sette). 2.3 mi. S Greenhorn Summit Lodge, Greenhorn Mtns., VII-7-63, 1♂ (A. H. Rubbert). Havilah, Piute Mtns., VI-20-2, 1 (F. Grinnell, Jr., CM); VI-2-22, 1 (MCZ). Nr. Lebec, VII-13-51, 1♂ (E. R. Hulbirt). Shirley Meadows, Greenhorn Mtns., 8000', VII-4-36, 1q; VI-27-37, 1q (both C. Henne). Tehachapi Mtns., 8000', VII-19-36, 2♀ + 1 larva (C. Henne, in Comstock and Dammers, 1938, not Greenhorn Mtns.). Ca. 3 mi. W Tehachapi, IX-17-60, "numerous" (J. W. Tilden). Tehachapi Mtn. Park, 6000', VII-14-59, 1q (F. T. Thorne). Tehachapi Mtn. Park entrance, 8 mi. SW Tehachapi, 5600', VI-30-63, 1q (E. M. Perkins). Lake County: Boggs Mtn. For. Sta., Cobb, 1 larva (F. Cobb, Jr., CIS). Lassen County: Black's Mtn., VI-13-41, 1q (P. D. Hurd, AMNH). Los Angeles County: Nr. Acton, V-17-25, 1q (J. D. Gunder, in Gunder, 1930). Crystal Lake Recreation Area, VII-27-53, 1♂ (J. S. Garth). 1.2 mi. S Little Rock Dam, ca. 3500', III-11-61, 1♂ (A. H. Rubbert). Pasadena, VII-20-2, 1 (CM). Ridge Route, VI-?-2, 1♂ (J. A. Comstock, in Gunder, 1930). Sierra Madre Range, VII-5-20, 1♂ (in Wright, 1922, Comstock, 1927, Gunder, 1930; cuyamaca paratype no. 4). Madera County: Bass Lake, 3500', ca. VI-24-59, 1 (E. Pfeiler). Mariposa County: Meadow nr. Bridleveil Crk. Campground, Yosemite National Park, VI-20-24-61, "several" (T. P. Webster). Ca. 1 1/2 mi. ESE Crane Flat Ranger Sta., Yosemite Nat'l Park, 6100', VII-25-64, 1 larva (O. Shields). Jerseydale, 8.5 air mi. NE Mariposa, 3800', VI-18-57, 1q; VII-27-62, 1♂ 1q; VII-29-62, 1q; VIII-3-62, 1♂; VII-25-63, 1♂; VIII-2-63, 1q; VIII-4-63, 1q (all O. Shields). 2 mi. W Mariposa, ca. 1800', 2♂ (J. Roberts). On talus slope overlooking Mirror Lake, Yosemite Valley, 5000', VII-7-63, 1q (J. C. Montgomery). Tioga Road near Tamarack Flat, 7 mi. W Yosemite Valley, 7200', VII-8-53, 1♂ (A. H. Moeck). Yosemite Valley, VII-17-19, 1♂ (AMNH). Modoc County: Willow Ranch, VII-?-26, 1q (G. Heid, CAS). Mono County: Spring Canyon, 3 mi. NE Walker, VI-24-62, 1q + 4 (J. A. Powell, C. D. MacNeill, CIS and CAS). Monterey County: Nr. entrance of Del Monte Lodge, Monterey Peninsula, VIII-?-54, "saw 1" (J. C. Spencer). Riverside County: Upper Chino Canyon, III-?-2, "seen" (T. W. Hower). Idyllwild, VII-?-26, 1♂; VII-10-27, 1♂ (both J. S. Garth). Middle Drive, Idyllwild, San Jacinto Mtns., 5500', IX-6-64, 1♂ (J. F. Emmel). Desert side San Jacinto Mtn., "specimens" (Herr, in Grinnell and Grinnell, 1907). On trail to Mt. Taquitz, Idyllwild, 6500', IX-1-57, 2♂ 1q (J. C. Montgomery). San Bernardino County: Mt. Baldy Road, above Baldy Village, 5000', VI-17-61, 1♂ (D. Beals). Big Bear Lake, SE side, VI-17-34, 1♂ (E. R. Hulbirt). Bonanza King Mine, Providence Mtns., III-31 to IV-8-34, 1q (AMNH); IV-12-47, 2♀ (E. R. Hulbirt); IV-10-60, 1♂ (P. Opler); 3700', IV-22-38, 1q (C. Henne). Nr. Camp Radford, VII-6-63, 1q (R. E. Stanford). Mitchell Caverns State Park, Providence Mtns., IV-10-60, 1♂ (P. Opler). Canyon NNW Mitchell Caverns S. P., Providence Mtns., ca. 4200-5000', IV-13-63, 1♂ 1q (C. Henné, O. Shields); ca. 5000', IV-11-64, 1♂ 2♀ (S. K. Dvorak, O. Shields). 6 air mi. S Ivanpah, New York Mtns., IV-16-64, 1♂ 2♀ (R. L. Langston). Lytle Creek, NW San Bernardino, early-VII-36, 1q (T. W. Hower, in Comstock and Dammers, 1938). Providence Mtns., V-5-34, 1♂ (G. H. and J. L. Sperry, AMNH). Atop peak in Providence Mtns., III-25 or 26-63, 2♂ (J. F. Emmel). Rim of the World Highway, nr. Lake Arrowhead turnoff, 5000', VII-28-37, 7 larvae (C. Henne, in Comstock and Dammers, 1938). Nr. mouth S. Fork Santa Ana River, 6200', VII-2-06, 1♂; 6400', VII-20-06, 1q (both J. and F. Grinnell, in Grinnell and Grinnell, 1907). Along Santa Ana River, 1 mi. W of E end Barton Flats, 5500', VIII-12-63, 1q (T. C. Emmel). Santa Ana River, N Barton Flats, ca. 5500', VI-29 to VII-1-64, 2♂ 6♀; VII-11-64, 1♂ (both S. K. Dvorak). Stocton Flats, 6000', VI-28-30, 1q; VI-14-36, 1q (both T. W. Hower). 3-4 mi. SE Wrightwood, San Gabriel Mtns., 4500', VI-21-64, 1 (R. Meyer). San Diego County: Boiling Springs and/or Horse Heaven Canyon, ca. 2 mi. NW Mt. Laguna, Laguna Mtns., ca. 5500-5700', IV-29-34, 3♀; V-24-36, 7♀; VI-26-42, 1♂; V-21-44, 2 (all F. T. Thorne); IV-28-46, 1♂ 10♀ + 12 (J. L. Creelman, SDNM); V-2-46, 4♂ 5♀; V-4-46, 1♂ 1q + 3 (F. T. Thorne); IV-25-48, ca. 60; V-16-48, ca. 60, mostly ♂♂ (all J. L. Creelman); V-27-51, "saw 1" (F. T. Thorne); VII-15-51, 1♂ 2♀ (R. L. Langston, F. T. Thorne); VII-22-56, 2♂ 1q; V-5-57, 1 (all F. T. Thorne); V-5-57, 1♂ (A. H. Rubbert); V-25-58, 3; VIII-9-58, 3 (all F. T. Thorne); IV-9-60, 1q (R. W. Breedlove); IV-16-60, 2♂ 1q (R. W. Breedlove, W. A. Hedges, F. T. Thorne); VIII-6-60, 3♂; IV-9-61, 3♂ 15♀; IV-15-61, 2♂ 6♀; V-20-61, 1♂; V-29 to 30-61, 2♂ 2♀ (all R. W. Breedlove); VI-14-61, 1q (F. T. Thorne); VI-17-61, 1q (R. W. Breedlove); VI-24-61, 2♂ 6♀ + 1 (W. A. Hedges, F. T. Thorne); IV-21 to 24-62, 20♂ 24♀ + 3 (R. W. Breedlove, W. A. Hedges, F. T. Thorne, 6 in SDNM); IV-27-62, 10♀ + 12 (S. K. Dvorak, W. A. Hedges); V-6-62, 10♀; V-25-62, 3♀ (all O. Shields); VI-5-62, 7♀; VI-6-62, 1♂ 11♀ (both S. K. Dvorak); VI-7-62, 3♀ (O. Shields); VI-9-62, 1q (F. T. Thorne); VI-16-62, 13♀ (S. K. Dvorak); VII-17-62, 1q (F. T. Thorne); VIII-18-62, 1♂ (R. W. Breedlove); IV-13-63, 2♂ 14♀ (R. W. Breedlove, S. K. Dvorak, W. A. Hedges); V-12-63, 1♂ 4♀ (O. Shields); V-19-63, 1♂ 2♀ (R. W. Breedlove); VI-2-63, 9♂ 2♀; VI-9-63, 1♂ 7♀; VI-15-63, 5♂ 17♀; VI-29-63, 3♂ 14♀; VI-30-63, 19♀; VII-4-63, 2♂ 7♀ (all S. K. Dvorak); VII-17-63, 1♂ 3♀ + 1 larva

(F. T. Thorne); VII-4-63, 1♂ 8♀; VIII-9-63, 5♀; VIII-17-63, 1♂ 5♀; VIII-24-63, 7♀ (all S. K. Dvorak); V-16-64, 1♂; V-22-64, 1♂ 4♀ (both O. Shields); V-23-64, 2♂ 9♀ (K. Roever, O. Shields, F. T. Thorne); V-31-64, 2♀ (S. K. Dvorak); VI-6-64, 3♂ 2♀ + 1 (S. K. Dvorak, O. Shields); VI-15-64, 2♂ 2♀; VI-21-64, 1♂; VII-16-64, 3♂ 1♀; VII-29-64, 1♀ (all S. K. Dvorak); IV-28-64, 2♀ (F. T. Thorne); V-1-64, 5♀ (O. Shields); V-9-64, 3♂ 9♀ (O. Shields); V-16-65, 2♂ 7♀ (F. T. Thorne); V-20-65, 10♂ 11♀ (F. T. Thorne); V-27-65, 4♂ (R. W. Breedlove). Carrizo Creek, 4 mi. SE Henshaw Dam, VII-20-64, 3♂; VII-28-64, 2♀ (both S. K. Dvorak). Cuyamaca, Laguna Mtns., VII-21-25, 1♂; VII-27-26, 1♂ 1♀ (CIS). W below Cuyamaca Dam, VI-23-62, 2♀ (S. K. Dvorak). Cuyamaca Lake, VII-7-18, 1♂ (SDNH, cuyamaca allotype, in W. S. Wright, 1922). W below Henshaw Dam, ca. 2700', VI-29-63, 1♂ 11♀; VII-4-63, 4♀; VII-8-63, 12♀; VII-20-63, 5♀; VII-27-63, 13♀ (all S. K. Dvorak). Julian, VIII-4-17, 3♂ 1♀ (cuyamaca holotype ♀ and paratypes 1-3 ♂♂, in Wright, 1922); VII-4-18, 1♀ (USNM, paratype in Wright, 1922). Laguna Mtns., VI-30-20, 1♂; VII-21-23, 1♂ 5♀ (both W. S. Wright, LACM); VII-27-24, 1♂ 1♀ (W. S. Wright, SDNH); VII-20-24, 1♀; VII-27-24, 1♂; VII-28-24, 13♂ 4♀; VII-29-24, 1♂ 1♀; VII-30-24, 5♂; VIII-1-24, 2♀; VIII-7-24, 2♂; VIII-8-24, 1♀ (all AMNH); VII-10-25, 1♂; VII-19-25, 2♂ 1♀ (both CAS); VII-14-26, 1♀ (SDNH); '9.31.26", 1♂ 4♀ (G. Field, SDNH and CNHM); V-6-28, 1♀; VI-28-33, 1♀; VII-27-33, 1♂ (C. M. Brown, AMNH); VII-28-34; VI-18-38, 1♂ (C. M. Dammers, LACM); V-5-46, 1♀ (J. L. Creelman, SDNH); VI-25-53, 1♂ (J. A. Powell, CIS); ca. 6000', V-29-64, 1♂ 3♀ (F. T. Thorne). Mt. Laguna, Laguna Mtns., VII-28-33, 1♀ (AMNH); VII-28-35, 1♀ (C. M. Brown); 6000' (CM). Ca. 3 mi. N Palomar P. O., Palomar Mtns., VI-27-64, 3♂ 2♀ (S. K. Dvorak). Pine Valley, V-16-48, 1♂ (J. L. Creelman, SDNH), 4 mi. NE Pine Valley, Laguna Mtns., VI-11-60, 2♂; V-21-61, 1♂ (both O. Shields). Santa Ysabel Creek, Volcan Mtn., VI-15-63, 3♀ (S. K. Dvorak). Warner Hot Springs Mtn., 6000', VI-16-52, 1♂ larva (A. Forbes). 3 mi. E Wynola, Volcan Mtn., VII-29-57, 1♀ (F. T. Thorne). Shasta County: Saratoga, VII-?-43, "some" (T. B. Blevins). Shasta County: Castella, VI-?-03, 1♀ (F. X. Williams, CAS). Lake Britton, VII-16-54, 1♂ (C. D. MacNeill, CIS). Sierra County: Gold Lake Lodge, 6560', VII-1-61, 2♂ (P. Opler, in Opler, 1962). Siskiyou County: Mt. Shasta district, 1 (MCZ); 1♀ (H. Edwards, AMNH). Timberline, Mt. Shasta, VII-20-36, 1♂ (E. C. Johnston, AMNH). Tehama County: Inskip Mtn., Highway 32, ca. 2500', IV-16-60, 2♂; V-1-61, 1♂ (S. O. Matton). Tehama-Butte County line: Mouth of Pine Creek Canyon, 15 mi. SE Vina, ca. 500', III-19-60, 1♂ (S. O. Matton). Tulare County: Big Meadow, Sequoia Natl For., VI-26-61, 1 (T. P. Webster). Mineral King, VI-24-30, 1♂ (USNM); 8000', VI-20-61, 1 (E. Pfeiler). Quaking Aspen Meadows, nr. Camp Nelson, 4500', VII-4-37, 1♂ (C. Henne). Smokey Valley, XYZ Creek, 6000', V-18 to 20-53, 1♂ 2♀ (C. Henne, C. H. Ingham). Tuolumne County: Rd. to Aspen Valley, 1 mi. S to 3 mi. SW Ackerson Meadow, 5100', VIII-2-64, 2 larvae; 5300', VIII-2-64, 6 larvae; 5400', VIII-2-64 8 larv.; 5900' (all O. Shields). Crane Flat Ranger Sta., Yosemite Natl Park, 6200', VIII-28-64, 1 larva (O. Shields). Dodge Ridge, VII-20-51, 1♀ (C. D. MacNeill, CIS). Groveland Ranger Sta., 7 air mi. ESE Groveland, 3300', VII-23-64, 1 larva (O. Shields). Hog Ranch, 1 mi. E Mather, 4600', VII-3-64, 1♀ (O. Shields). Nr. Jacksonville, VII-12-61, 1♀ (J. A. Powell, CIS). Pinecrest, nr. U. C. summer camp, VI-25 to 26-52, 2♂ (W. Patterson). Rush Crk. Campground, 5.5 air mi. SSW Mather, 4600', VII-23-64, 1 larva (O. Shields). Tamarack Flat, Yosemite N. P., VII-4-54, 1♀ (J. W. Tilden). Tioga Road, VI-24-59 (J. S. Garth, in Garth and Tilden, 1963). Tuolumne Grove Big Trees, Yosemite N. P., 5900', VII-28-64, 4 larvae (O. Shields). Ventura County: Quatal Canyon, NW corner Ventura Co., 5000', IX-12-64, 1♂ (J. A. Powell, CIS). County undetermined: Bramley, VII-2-26, 1♂ (AMNH). Lassen National Park, VII-21-37, 1♀ (J. A. Comstock, LACM). Mountains of California, 1♂ (Morrison, BMNH). Panamint Mtns., IV-?-91, 1♀ (USNM). Yosemite. VI-21-34. 1♀ (T. Craig, CAS).

Amador County: Jackson Rd., IX-2-63, 2 lar. (J. Hamai). Sierra County: Gold Lake Lodge, 6560', VII-19-65, 1♀ (O. Shields).

**COLORADO.** Boulder County: Highway 119, 3 mi. W Boulder, VI-3-60, 1♂ 3♀ (R. J. Jae). Boulder Canyon, V-16-64, 1♂ 1♀ (D. Eff). Road to Brainard Lake, above Ward, 9500', VI-11-54 (R. Leuschner); 9600', VI-12-54, 4♀ (D. Eff, in Brown, 1955). Cardinal Hill, ca. 3 mi. SW Nederland, ca. 8800', VI-13-53, 1♂ 1♀; VI-13-54, 1♂ 1♀; VII-1-57, 1♂ 1♀; VI-28-60, 1♀ (all D. Eff, in Brown, 1955). Eldora, VII-11-47, 1♀ (P. S. Remington). Eldora and Nederland, ca. 10,000', VI-29 to VII-14-37, 1♂ 7♀ (C. L. and P. S. Remington, in Brown, 1955). Elk Park, VII-13-40 (Rodeck, in Brown, 1955). Flagstaff Mtn., VI-18-53, 2♀ (D. Eff, in Brown, 1955); VI-23-53, 1♀; VI-15-58, 1♂ 1♀; VI-28 to VII-1-59, 1♂ 4♀; VI-21-60, 1♀; V-28-63, 2♀; VI-13-63, 1♂ 1♀ (all D. Eff). Four Mile Canyon, V-8-48 (D. Eff, in Brown, 1955); V-16 to 19-58, 1♂ 1♀. Four Mile Creek Canyon, nr. Crismon, V-18-54, 1♀; V-24-58, 1♂ 1♀ (all D. Eff). Ca. 2 mi. W Gold Hill, VI-12-59, 1♀ (D. Eff). Lefthand Canyon, VI-12-54 (D. Eff, in Brown, 1955); V-23-58, 1♀ (D. Eff); V-23-62, 1 (J. Scott). Lickskill Gulch, N Gold Hill, 7800', V-18-54, 1♀ (D. Eff, in Brown, 1955). Magnolia Road, V-30-54, 1♀ (D. Eff, in Brown, 1955); VI-2-60, 1♂ (D. Eff). Mt. Meeker Camp Grounds, Thompson Canyon, 7500', VI-30-53, 2♂ 3♀ (A. H. Moeck, in Brown, 1955). Millionaire Gulch, nr. Sugarloaf, ca.



- 7000', V-15-52, 1q (D. Eff. in Brown, 1955). Nederland, 8100', VII-9-49, 1q (C. L. Remington, PM). Nr. Nederland, 8369', VIII-2-57, 3σ (R. J. Jae). Soda Spring gulch, S Crismon, ca. 6261', VI-7 to 8-53, 3σ 3q (D. Eff. in Brown, 1955); V-16-58, 3σ 3q; V-19-58, 1σ 4q; V-17-60, 1q (all D. Eff.). Sugarloaf, VI-2-57, 1q; V-19-58, 2σ 2q (all D. Eff.). Nr. Sugarloaf, V-30-58, q (all D. Eff.). Sugarloaf, VI-2-57, 1q; V-19-58, 2σ 2q (all D. Eff.). Placer Valley, 7500', VI-23-53 (H. Epstein, in Brown, 1955). Squaw Mountain Meadow, 11,000', VII-3-64, 11σ 6q, "numerous" (R. J. and D. A. Jae). Costilla County: Valles Crk., VI-27-44 (B. Rotger, in Brown, 1955). Custer County: San Isabel Nat'l For., Wet Mtns., highway 96, ca. 7800', VI-16-59, 1q (W. H. Howe). El Paso County: Rock Crk., 8500', VI-18-53 (F. M. Brown and H. Epstein, in Brown, 1955). Star Ranch, 6 mi. S Colorado Springs, on highway 115, 6700-6800', V-19-62, 4σ; VI-11-62, 1q; VI-14-62, 1q; VI-29-62, 1q; V-4-65, 1; V-12-65, 3 (all S. A. Johnson). USAF Academy, 8000', VI-3 to 4-62, 3; mid-to late-V-63, 4 (all J. A. Justice). Gilpin County: Lump Gulch, VII-27-57, 1 (H. G. Rodeck, UC). Rollinsville, VI-24-53 (H. Epstein, in Brown, 1955); VI-8-58, 2σ 2q (R. J. Jae); VI-16-58, 8σ 18q; VI-18-58, 1σ 1q (all R. J. Jae); VI-14-60, 1q (J. Hazlett); VI-23-64, 1σ 32q (J. A. Justice). Nr. Rollinsville, VI-14-60, 8σ 31q (R. J. Jae). Summer Home Group, Rollinsville, highway 119, 8380', VII-3-55; 2σ; VII-21-54, 1σ 1q (all R. J. Jae). Tolland, VI-28-47, 1; 8900', VI-29-49, 3σ 4q (all D. Eff.). Grand County: Fraser, VII-2-54, 1σ 1q; VII-3-54, 1σ; VII-4-54, 1q (all J. J. Renk). Grand Lake, VII-4-35, 1q (E. R. Hulbirt); VII-1-49, 8 (V. Nabokov, CU). Hideaway Park, VII-4-60, 12 (Noel La Due); 8715', VI-23-54, 1σ (L. M. Martin); ca. 8900', V-?-2, "swarming" (W. Tyerlyar); VI-23-54, 2σ 3q (D. Eff. in Brown, 1955); 9000', VI-27-62, 2q (S. Ellis, S. A. Johnson); VII-5-64, 3σ (R. J. Jae). Hideaway Park, Idlewild, VIII-4-64, 1σ (J. A. Justice). Maryvale, nr. Fraser, VI-25-54 (J. J. Renk, in Brown, 1955); VI-28-55, 2σ (J. J. Renk). Maryvale, Middle Park, 9000', VI-27-60, 14σ 9q (R. J. and B. R. Jae). Middle Park, 9000', VII-1-60, 2σ 1q (R. J. Jae). 1 mi. W Tabernash, 9000', VI-27-62, 1σ (S. Ellis). Gunnison County: Coal Crk., VI-6-64, "saw 1" (S. Ellis). Snowshoe Creek, 3 mi. SE Paonia Dam, 7720', VI-14-63, 1σ (S. Ellis). Jefferson County: Conifer, VI-7-02, 1σ 1q (A. J. Snyder, CNHM). The Terepees, VI-23-64, 1q (R. J. Jae). La Plata County: Durango, V-?-99 (Oslar). Larimer County: Between Columbine Lodge and Lily Lake, Estes Park, 9500', "Last week of V-47", 20 (V. and D. Nabokov, MCZ and CU). La Porte, VII-13-34, 1σ (K. Maehler). Long's Peak, 9000-9500', VI-25-53 (H. Epstein, in Brown, 1955). Ca. 8 mi. W Redfeather Lakes, ca. 9300', "larvae" (T. E. Hinds, USNM, in Remington, 1958). Trail Ridge, Rocky Mountain N. P., VII-9-33, 1q (G. H. and J. L. Sperry, AMNH). Mesa County: W end Black Ridge, nr. Colorado National Monument, ca. 7000', VII-23-64, 1σ (T. C. Emmel). Park County: Bailey, VI-23-63, 1σ (J. Scott). Hall Valley, 9600', VI-28-53, 1 (F. M. Brown, UC, in Brown, 1955). 4 mi. E Kenosha Pass, VI-17-71 (Mead, in Brown, 1955, minus TL). Pueblo County: Beulah, VI-16-42, 2σ 4q (D. B. Stallings and J. R. Turner, in Brown, 1955). Summit County: Dillon, VI-27-53 (H. Epstein, in Brown, 1957). Gore Range Trail, nr. Cataract Creek, 9000', VI-17-64, 1σ (J. A. Justice). Snake River, VI-22-53 (H. Epstein, in Brown, 1955). Teller County: Big Spring Ranch, nr. Florissant, 8640', VI-19-60, 1q; VI-25-60, 1q + 1 (All T. C. Emmel). Pike National Forest, 7750', V-12-63, 2σ. County undetermined: 1σ (Belt, BMNH). Battie Mtn., Rocky Mountain National Park, VI-21-53, 1q. "Denver" (CM). Rocky Mountain N. P., VI-22-53, 1σ (L. M. Martin, LACM); 10,000', VII-9-59 (E. J. Dornfeld). Above Sprague's Lodge, 8800', Rocky Mtn., N. P., VI-23-53, 1σ (P. C. Ritterbush, PM). Sprague's Lodge, 8700', Rocky Mtn. N. P., VI-25-54, 1q (P. C. Ritterbush, PM).
- Boulder County: Baird Park, Gregory Cn., IV-21-65, 1σ (J. Scott); Four Mile Cn., V-29-65, 12σ 5q (J. Scott); Sugarloaf Mtn., V-29-65, 3σ 9q. Mesa County: Black Ridge, 7000', V-30-65, 1σ (S. Ellis).
- IDAHO. Blaine County: Ketchum, VII-20-54, 1σ (E. R. Hulbirt). Bonner County: Priest River, 1q (USNM); V-24 to 25-10, 1σ 1q (C. W. Herr, LACM); VI-8-15, 1q (USNM). Butte County: Bear Pass Crk., VII-26-47, 1σ (R. M. Bohart, CIS). Kootenai County: NE end of Hayden Lake, VII-12-62, 2q (D. L. Bauer). Spirit Lake, VII-1 to 7-?, 1q (USNM).
- Latah County: Moscow Mtns., V-26-28, 2q (AMNH). Moscow Mtn., cal. 5000', VI-29-60, 1q + 1; cal. 3500', VII-1-64, 1σ + 1 (both R. E. Miller). Lemhi County: Gibbonsville, VII-1-58, 1q (D. L. Bauer). Valley County: Bear Valley, VII-2-58, 1q (D. L. Bauer). McCall, Payette Lakes, VII-20-44; VII-17-45 (both J. H. Baker).
- MONTANA. Beaverhead County: Elkhorn Hot Springs, VII-11-59, 3σ 4q + 3 (T. W. Davies). Polaris, VI-25 to 27-? (CM); VI-15-41, 1σ 1q; VI and VII-42, "series". Flathead County: Kintla Crk., Glacier Nat'l Park, VII-2-50, 1σ (J. S. Garth). Lake McDonald, Glacier N. P., VII-12-54, 1q (J. S. Garth). 1 mi. S Lakeside on highway 93, 2800', VII-1-61, 1σ (E. M. Perkins). Gallatin County: Ousel Falls (CM). West Yellowstone, VI-21-62, 1 (J. Scott). Glacier County: Saint Marys, Glacier N. P., 4500', VII-22-35, 1σ (J. S. Garth). Saint Mary's Baring, Glacier N. P., VII-27-35, 1σ (J. S. Garth). Sunrift Gorge, Glacier N. P., VII-14-35, 1q (J. S. Garth). Granite County: VII-?-? (CM). Missoula County: Lee Crk. Camp, 1 mi. S Lolo Hot Springs, 4000', VIII-4-56, 1σ (F. and P. Rindge, AMNH). Patee

Canyon, VI-23-62, 1 (J. Scott). Powell County: Rock Crk. Lake, VII-2-59, 1♂ (T. W. Davies). Ravalli County: E. Fork Bitterroot River, 2 mi. N Sula, ca. 3000', VII-20-64, 1♂ (J. H. Shepard). Warm Springs Campground, VII-7-62, 2 (J. Scott). County undetermined: Hillside above Anaconda Crk., Glacier N. P., VI-28-50, 1♀ (J. S. Garth). Martina, 1♀ (USNM, in Wright, 1922).

NEVADA, Clark County: Charleston Mtns., VI-29-35, 1♀ (J. L. Bauer, LACM). Mt. Charleston, VI-15-40, 1♀ (L. I. Hewes, CAS). Mt. Charleston area, VIII-6-61, 1 (R. Stanford). Hidden Forest, Sheep Range, cal. 7000', VI-23-61, 1 (K. Roever). Lee Canyon, Spring Mtns., ca. 6000', VI-23-61 (K. Roever). Douglas County: E side Daggett Pass, IX-1-63, 1♀ (D. L. Bauer). Ca. 6-10 mi. SE Gardnerville, highway 395, 5900', VII-20-64, 1 larva (O. Shields). Haines Canyon, V-11-64, 1♂ (D. L. Bauer). Kingsbury Grade, State Highway 19, 5400', VII-19-64, 6 larvae (O. Shields); 5700', VIII-10-62, 1♀; VIII-12-62, 3♀; VIII-13-62, 1♂; VIII-15-62, 2♂ 1♀; VI-13-63, 1♂ 1♀ (all P. Herlan, NSM); VII-17-64, 2♀ (J. C. Downey); VII-18-64, 8 larvae (J. F. and T. C. Emmel, J. C. Downey, O. Shields); VII-20-64, 2 larvae; 6400', VII-20-64, 1 larva (both O. Shields). Pine Nut Crk., 5500-6000', V-21-64, 1♀; VI-12-64, 1♂ 1♀ (both D. L. Bauer). Lyon County: O'Banion Canyon, 8 mi. S Wellington, 6000-7000', V-15-64, 4♂ (D. L. Bauer). Mineral County: Montgomery Pass, 7166', VI-26-53, 1 (D. Giuliani). Ormsby County: Nr. Sand Harbor State Park, Lake Tahoe, VI-9-41, 1♂ (D. L. Bauer). White Pine County: Lehman Crk., Mt. Wheeler, 7200', VI-3-64, 2♀ (K. B. Tidwell). Mt. Wheeler, V-30-29, 1♀ (F. W. Morand, AMNH). County undetermined: Gardner (CM).

Lake County: 5 mi. S. Crane Mtn., Mission Range, VII-10-64, 1♀ (C. L. and S. T. C. Remington); Porcupine Crk. Rd., S. Swan Lake, VII-7-64, 1♀ (C. L. Remington).

NEW MEXICO, Bernalillo County: N end Sandia Mtns., loop rd., VII-9-63, 1♀ (K. B. Tidwell). E slope Sandia Mtns., V-18-59, 1 (P. R. Ehrlich, CM). Catron County: 2-3 mi. E Mogollon, 7200-7600', VII-10-61, 1♂; VII-11-61, 3♂; VII-13-61, 1♀; VII-17-61, 1♂ 2♀ (all F., P. and J. Rindge, AMNH). Mogollon Range, V-7-40, 4♀ (UCM). Willow Crk. Ranger Station, 25 mi. E Alma, 8000', VII-15-61, 2♀ (F., P. and B. Rindge, AMNH). Dona Ana County: Rincon, VI-23-98, 1 (C. J. Paine, MCZ). Grant County: Gila Nat'l For., Pinos Altos Mtns., 7500', VII-26-52, 1♂ (A. H. Moeck). McMillan Camp, 13 mi. N Silver City, 6800', VII-24-61, 2♂ 3♀; VII-30-61, 1♀ (both F., P. and J. Rindge, AMNH). McKinley County: Fort Wingate, 1♂ 1♀ (AMNH); IV-16 to 23-?, 1♀; IV-24 to 30-?, 1♀; V-1 to 7-?, 1♀; V-16 to 23-?, 1♂; V-24 to 31-?, 1♂; VI-8 to 15-?, 1♂; VII-1 to 7-?, 1♀ (all USNM); V-17-06, 2♂ + 1 (CM and AMNH); VI-9-06, 1♀; "2, 28, 10", 1♀; V-6-10, 1♀; V-7-10, 1♀; V-10-10, 1♂; V-17-10, 2♂; V-19-10, 2♂ (all AMNH); VI-16-23 (CNM). Otero County: Alamogordo, V-2-02, 1 (CM). Cloudcroft, V-?-2 (A. W. Lindsey); 8400', VI-4-46, 2♂ 2♀ (D. B. Stallings, J. R. Turner). 2 mi. NE Cloudcroft, Sacramento Mtns., 8500', VI-4-61 (K. Roever). Mayhill, 8200', VI-4-46, 2♂ 1♀ (D. B. Stallings, J. R. Turner). Pine Forest Camp, 2 rd. mi. NE Cloudcroft, 8500', V-6-61, 1♂ 1♀ (K. Roever). Sandoval County: Jemez Springs, V-3 to 5-?, 2♂ 1♀; V-25-12; III-20-13; V-17-13; V-20-13; V-21-13 (all but 1st, CM, "series"); VII-2-29, 1♂ (AMNH); 7000', IV-9 to 23-? (CM); VI-6-26, 1♀; VI-16-26, 3♀; VI-18-26, 1♂ 3♀; VII-2-26, 1♂; 8500', VI-20-26, 1♂ 2♀; 6600', VII-3-26, 1♂ (all AMNH). 3 mi. S Placitas, E slope Sandia Mtns., 6600', VII-15-64, 4 (M. Toliver); VII-25-64, 1♀ + 2 (R. Holland, M. Toliver); VIII-2-64, 1♀ + 1 (R. Holland). Socorro County: Bear Trap Camp, 28 mi. SW Magdalena, 8500', VII-19-64, 1; VII-22-64, 1 (both F., P. and M. Rindge, AMNH). Santa Fe County: Hyde State Park, 8 mi. NE Santa Fe, 8700', VII-29-64, 1 (F., P. and M. Rindge, AMNH). 2 mi. E Tesuque Pueblo, 7000', VIII-10-34, 1 (M. Hebard, CM). Taos County: Taos, 7500', VI-18-46, 3♂ 1♀ (D. B. Stallings, J. R. Turner). Vinatera Campground, Taos Canyon, 2 mi. E Taos, IV-21-62, 2 (J. Scott). County undetermined: Gila River, VII-6-90 (CM).

OREGON, Baker County: Anthony Lake, 6500', VII-12 to 13-51, 2 (R. Albright); 7100', VII-9-57 (J. W. Tilden). Baker, VII-4-41. Durkee, VI-10-40. Pine Creek, 11 mi. W Baker, 4000-5000', VI-17-31 (J. H. Baker); 4100', VII-7-57, 1♂ 1♀ (J. W. Tilden). Powell Creek, 2 mi. W Durkee, VII-18-? (J. H. Baker). Nr. Powder Lake, vicinity of Baker, VII-12-53, 1♂ (J. H. Baker). Powder Mtns., V-8-06, 1♂ (AMNH). Spring Creek, 3700', VI-21-55 (J. H. Baker). Clackamas County: Clackamas Lake, 4000', VII-3-61 (E. J. Newcomer). Crook County: S side of Big Summit Prairie, 4500-5000', VII-1 to 2-61 (E. J. Newcomer). Maury Mtns., 4500-5000', VII-1 to 2-61 (E. J. Newcomer). Ochoco Nat'l For., highway 26, 4000', VI-19-58 (E. J. Dornfeld). Ca. 16 mi. E Prineville, VI-7-58, 1♀ (S. G. Jewett, Jr.). Deschutes County: Nr. Bend, VI-20-39, 1♀ (CIS); VI-23-39, 1♀ (CIS). Along Little Deschutes River, nr. Odell Butte, ca. 4500', VI-2-57, 30 (R. Albright, H. Rice). Douglas County: Nr. Diamond Lake Lodge, VII-1-47, 1♀ (T. W. Davies). Grant County: Ize, 4046', V-23-34 (S. G. Jewett). Harney County: Cricket Creek, 13 mi. NW Burns, VII-11-63, 1♀; VII-21-63, 2♀ (both C. R. Crowe). Jefferson County: Metolius River area, 1 mi. WSW Camp Sherman, VI-14-64, 1♂ (C. W. Nelson). Klamath County: Annie Creek, S. boundary of Crater Lake National Park, VI-22 to 23-60, 2♂ (J. W. Tilden, D.

Huntzinger). Aspen Lake, VI-2-50, 1♀ (S. G. Jewett, Sr.). Beaver Marsh, VII-16-64, 1♀ (J. Scott). Bly Mtn., 5000', VI-22-59; VI-14-61; VII-7-62; VI-17-63 (all E. J. Dornfeld). Junction of Crescent Creek and State Hwy. 58, ca. 4000', VI-27-62, 1♂ (K. Goeden). Diamond Lake, 5000', VII-12-46, 1 (R. Albright); VI-21-62, 1♀ (C. A. Toschi, CIS). Fort Klamath, 1♀ (USNM). Gilchrist, 4500', V-27-58; VI-18-60; VII-10-60; VI-25-61; VII-8-62, "fairly numerous"; VI-18-63, 10 (all E. J. Dornfeld). Miller Crk., 4000', VI-30-62, 1♀ (E. J. Newcomer). Skookum Meadow, 5200', VII-23-61 (E. J. Newcomer). 5 mi. N Sun Pass, 4750', VII-10-62, 21 (D. J. Dornfeld). Lake County: Quartz Mtn., 5500', VI-12-62 (E. J. Newcomer). Morrow County: Willow Crk., nr. Heppner, 3500', V-4-62, 2♀; 3500-4000', V-16-62, 2♂ (both D. L. Bauer). Wallowa County: Chief Joseph Mtn., Joseph, VII-14-50, 1♀; VII-15-50, 1♀; VII-16-50, 1♂ 2♀ (all N. Crickmer, AMNH); VII-2-50, 1♂; VII-7-50, 1♂; VII-8-50, 1♂; VII-10-50, 1♀; VII-15-50, 3♀; VII-16-50, 1♀; VII-20-50, 1♀; VII-22-50, 1♀; VII-24 to 25-50, 1♂ 1♀ (all G. H. and J. L. Sperry, AMNH). Wallowa Lake, VI-14-39, 1♀ (CIS). Wheeler County: Fairview For. Camp, ca. 12 mi. N Spray, VI-7-62, 1♂ (D. L. Bauer).

UTAH. Beaver County: Beaver Canyon, VIII-2-?, 1♂ 1♀ (USNM). Garfield County: Bryce Canyon National Park, 8000', VII-8-61, 1♂ (K. B. Tidwell). Grand County: Warner Ranger Sta., La Sal Mtns., 9500', VII-21-36, 1♂. Summit County: E. Fork Bear River, Uinta Mtns., VII-3-64, 1♀; VII-4-64, 1♂; 8500', VII-17-62, 2♂ 3♀ (all K. B. Tidwell). N. Fork Provo River, Uinta Mtns., 7500', VI-7-61, 1♀; VII-14-61, 1♀ (both K. B. Tidwell). Tooele County: Loop Camp, Stansbury Mtns., 13 mi. SW Grantsville, 7400', VII-3-60, 1♀; VII-4-60, 1♀ (both F., P. and B. Rindge, AMNH). Lower Narrows Campground, Stansbury Mtns., VI-2-62 (K. B. Tidwell). South Willow Crk., Stansbury Mtns., VII-2-64, 1♀ (K. B. Tidwell). Uintah County: Kaler Hollow Camp, 22 mi. NNW Vernal, VII-24-63, 1♀ (F., P. and M. Rindge, AMNH). Utah County: Mt. Timpanogos, vicinity of ranger station, VII-12-47, 1♀ (E. R. Hulbert). Juab County: Mammoth, VI-17-65, 1 (J. Scott). Garfield County: Bull Cr., Henry Mtns., 4000', VI-16-65, 1♂ (S. Ellis).

WASHINGTON. Chelan County: Chelan (in Leighton, 1946). Coyote Crk., Lake Chelan (in Leighton, 1946). Mission Crk., nr. Cashmere, V-13-56, 2♀ (D. L. Bauer). Ca. 1, 5 mi. SE Plain, VIII-2-64, 9 larvae (D. V. McCorkle). 5 mi. S Plain, 2 larvae (D. Carney). Sand Crk., nr. Cashmere, V-29-57, 1♀ (D. L. Bauer). Second Crk. Canyon, nr. Plain, V-30-58, 2♀ (D. L. Bauer). Columbia County: Dayton, 3000', V-24-58, 1 (R. E. Miller). Table Rock, Blue Mtns., VII-20-35, 1 (J. F. G. Clark, CU). Tucannon River, Blue Mtns., VI-20-62, 1♂ 2♀ (R. E. Woodley); 3500', VI-17-61, 1♀ (E. J. Newcomer). Ferry County: Growden, Sherman Crk., Colville Nat'l For., VIII-30-63, \*2 larvae; VII-24-64, \*1 larva (both E. F. Wicker). King County: Beaver Lake (in Leighton, 1946). Kitsap County: Black Canyon, nr. Bremerton, V-4-47, 1♂. Klickitat County: Satus Pass, on old highway, 3149', V-25-63, 2♂ 1♀ (C. W. Nelson, S. F. Perkins). Satus Pass, 3000', VII-10-63, 1♂; VII-12-63, 1♀; 3700', VII-12-60; VII-3-62; VII-10-62 (all E. J. Newcomer). Nr. Satus Pass, 3000', V-18-63, 1♂ (E. J. Newcomer). Satus Pass Summit, VII-23-64, \*1 larva (D. V. McCorkle). Along highway 97, just N Satus Pass summit, VI-25-61, 1♀ (R. E. Woodley). Okanogan County: Black Canyon, VI-9-62, 1♂ (R. E. Woodley). Boulder Crk. (in Leighton, 1946). Brewster, V-10-39, 1♂; V-11-47, 1♂; V-6-49, 2♂; V-7-49 (all J. C. Hopfinger). Salmon Meadows, 4400', VI-22-59 (E. J. Newcomer); ca. 4500', VII-10-64, 1♀ (R. E. Woodley). Oreille County: Ruby (in Leighton, 1946). Spokane County: 4 mi. N Spangle, U. S. Highway 195, VIII-31-63, \*1 larva (E. F. Wicker). Yakima County: American River, V-24-58, 1♀ (J. H. Shepard). Bear Canyon, 25 rd. mi. NW Yakima, 3200', VII-2-60; VII-6-60; VI-22-62; VI-27-62, 1♂; VII-7-62 (all E. J. Newcomer). Chinook Pass Highway, 10 mi. E summit, VI-17-58, 1♀ (D. V. McCorkle). Mill Crk., 1100', VI-30-62, 1♀ (E. J. Newcomer). Oak Crk., off White Pass Highway, VI-13-60, 1♀; VI-16-60, 1♀ (both D. V. McCorkle). Oak Crk., 25 rd. mi. NW Yakima, 3500', VII-17-59; VI-24-60 (both E. J. Newcomer). Whatcom County: Bellingham, VI-30-17, 2 (J. F. Clarke, in Leighton, 1946). Okanogan County: Gold Crk., V-24-49.

WYOMING. Albany County: Albany, ca. 8500', VI-20-54; VII-4-55 (both G. R. DeFoliart, in DeFoliart, 1956). Centennial, 8500', VI-26-29, 1♀ (A. B. Klotz, AMNH). Nash Fork Crk. at State Highway 130, Snowy Range, VII-14-64, 1 (V. Hardesty). Pole Mtn., 8500', VI-28-53; VII-11-53; VI-19-54 (all G. R. DeFoliart, in DeFoliart, 1956). Snowy Range Pass, E side Medicine Bow Mtns., 8000', VII-7-55, 2♂ 6♀ (A. H. Moock). Carbon County: Medicine Bow Lodge, VII-26-64, 1 (J. Scott). Converse County: Camel Crk. Campground, Medicine Bow Nat'l For., 8000', VII-19-64, 4♂ 4♀ (R. Hardesty, D. Groothuis); VII-23-64, 1♀ (R. Hardesty). Cold Springs, 7800', VII-2-64, 1♀ (R. Hardesty). Fremont County: Little Sheep Mtn., Wind River Range, 9000', VII-23 to 24-35, 3♂; VIII-9 to 12-35, 1♀ (both A. B. Klotz). Louis Lake, 28 mi. SW Lander, 8600', VIII-2-62, 1♂ (F., P. and M. Rindge, AMNH). Sheridan County: 12-16 mi. SW Big Horn, 7700-8000', VII-19-59, 4♂ (F., P. and B. Rindge, AMNH). 13-15 mi. SW Big Horn, 7100-7900', VII-17-62, 3♂ 2♀ (F., P. and B. Rindge, AMNH). Long Park, 20 mi. SW Big Horn, 8100, VII-15-62, 3♂; VII-16-



62, 1♂ (both F., P. and M. Rindge, AMNH). Teton County: Nr. Colter Bay, Grand Teton National Park, VII-6-59, 1♀ (S. G. Jewett, Jr.). Grand Teton N. P., VI-20-30, 1♀ (E. C. VanDyke, CAS); VI-25-58, 1♀ (D. L. Bauer). 3.5 mi. N Grand Teton N. P., VII-6 to 7-59, 2♀ (S. G. Jewett, Jr.). Jackson Hole, VI-28-38, 1♀ (E. C. VanDyke, CAS). In Jackson Hole, along Yellowstone-Teton highway, VII-2-48, 1♀ (A. H. Moeck). Jenney Lake, Teton Mtns., VI-13 to 23-31, 2♀ (AMNH); VI-23-38, 1♀ (E. C. VanDyke, CAS); VII-16 to 17-59, 4♂ (T. W. Davies); 6800', VI-2 to 11-? (CM). Nr. Jenny Lake, VII-6 and 8-59, 1♂ 3♀ (S. G. Jewett, Jr.). Jenny Lake P. O., VI-26-58, 1♂ (J. S. Garth). Moran, VI-16-51, 1♀ (C. L. and J. E. Remington, PM). String Lake, Teton Range, VI-18-31, 1♀ (USNM). Taggart Lake trail, Grand Teton N. P., VI-18-62, 1 (J. Scott). Wilson, VIII-?-49, 1♂ (V. Nabokov, CU). Wilson Road, Grand Teton N. P., VI-26-58, 6♂ 3♀ (J. S. Garth). Yellowstone County: Upper Geyser, Yellowstone, "10.6.1888", 1♂ 2♀ (H. G. Elwes, BMNH). Yellowstone, 5♂ 5♀ ("F. D. G.", BMNH); 7000', VI-?-1887, 1 (H. J. Elwes, MCZ). Yellowstone National Park, 2♀ (AMNH); 1♀ (USNM); 1♂ (BMNH); (H. Y. Elwes, CNM); VI-22-41, 3♂ 1♀ (L. I. Hewes, pair in CAS); 6500', VII-7-38, 1♀. Yellowstone N. P., 44° 25' N, 110° 35' W, 7750', VII-20-20, 1♀ (AMNH).

C. (M.) JOHNSONI (= adults not reared)

CANADA.

BRITISH COLUMBIA. "Shawnigan", VI-17-25, 1♀ (E. H. Blackmore, USNM). Vancouver, VI-4-04 (R. V. Harvey, CNM); V-27-05, 1♂. North Vancouver, V-22-04, 1♀ (USNM).

UNITED STATES OF AMERICA.

CALIFORNIA. Lassen County: Silver Lake, VII-2-55, 1♀ (M. Doudoroff, in Dornfeld, 1959). Mariposa County: Jerseydale, 8.5 mi. NE Mariposa, 3800', VII-27-56, 1♂; VII-28-56, 1♀; VIII-9-56, 1♂; VII-27-62, 2♂; VII-28-62, 2♂; VII-22-63, 1♀; VII-23-63, 1♂; VII-24-63, 3♀; VII-25-63, 1♀; VII-26-63, 2♀; VIII-2-63, 1♀; VIII-3-63, 1♂; VIII-4-63, 1♂ 1♀; VIII-6-63, 2♀; VIII-19-63, 1♂; VII-25-64, 2♀ (all O. Shields). Placer County: Lower end of Sugar Bowl, Donner Pass, 15 mi. NW Lake Tahoe, VI-28-60, 1♀ (J. F. Emmel). Sierra County: 1.5 mi. E Bassett, 5460', VI-13-60, 1♂; VI-17-61, 2♀ (both P. Opler, in Opler, 1962). Gold Lake, VII-18-41, 6♂ 2♀ (AMNH). Gold Lake dam, VII-25-52, 1♀ (T. W. Hower). Gold Lake Lodge, 6560', VII-1 to 7-45, "30 or 40" (R. G. Wind); VII-1-61, 15♂ 1♀ (P. Opler, AMNH and PM, in Opler, 1962). Summit of Yuba Pass, 6708', VII-1-61, 1♂ 1♀ (P. Opler, in Opler, 1962). Siskiyou County: Castle Lake, VII-4-61, 1♂ (S. O. Mattoon). Nr. Dead Horse Summit, 5 mi. SE Bartle, 4500', VII-3-63, 1♀ (C. D. MacNeill, CAS). Tehama County: Mineral, VI-26-30, 1♂ (E. R. Hulbirt). Wilson Lake, VI-26-60, 1♂ (J. W. Tilden); VI-27-62, 1♂ 1♀ (N. La Due); VII-13-64, 1♂ (J. W. Tilden). Tuolumne County: Hog Ranch, 1 mi. E Mather, 4600', VII-27-64, 1♂; VII-29-64, 1♀ (both O. Shields).

OREGON. Linn County: Lost Prairie, 3400', VI-20-65, 4 (E. M. and S. F. Perkins). Lost Prairie, 3400', VI-20-59, 2♀; VI-2-59, 1♂ 1♀ (both E. J. Dornfeld, in Dornfeld, 1959); VI-4-60, 1♂; VI-?-60, 2♂ 1♀ (both R. E. Woodley); VII-22-64, 2♂ 1♀ (E. M. and S. F. Perkins). Tombstone Prairie, 4200', VII-4-59, 1♂ 1♀ (R. E. Woodley, in Dornfeld, 1959).

WASHINGTON. Jefferson County: Ca. 5 mi. SW Bogachiel Pk., Olympic Nat'l Park, ca. 700', VII-15-59, 1♂ 1♀ (J. C. Downey, CM). King County: Seattle vicinity, VII-15-91, 3 larvae (C. V. Piper, CM, one adult is a johnsoni type, in Skinner, 1904). Lewis County: 10 mi. below White Pass, SE Mt. Rainier, ca. 3500', VII-25-62, 1♂ (R. Leuschner). Mason County: V-30-51, 1♂ (AMNH). Lake Cushman, V-30-51, 2♂ 1♀; VI-10-51, 1♂; V-30-52, 3♂ 1♀; VI-10-52, 1♀ (all D. Frechin). Nr. Lake Cushman, VI-1-59, 1♂ (D. Carney); VI-2-61, 2♂ 1♀ (D. V. McCorkle). Stimson Crk., 2 (D. Frechin). Pierce County: Carbonado, 1100', V-18-58, 1♂ (V. Calkins). Nr. The Dalles For. Camp, U. S. Highway 410, VI-15-63, 1♀ (D. V. McCorkle, W. Boehm); VIII-13-64, 3 larvae; IX-1-64, 1 larva (both D. V. McCorkle). Longmire Springs, Mt. Rainier, 2000', 1♀ (USNM). Snohomish County: Garland Mineral Springs, nr. Index, VI-8-60, 1♂; VI-17-61, 1♀ (both D. V. McCorkle). Ca. 3 mi. W Maltby, on rd. to Alderwood Manor, VIII-7-63, 1 larva (D. V. McCorkle). Nr. Verlot, V-13-53, 1♂ (D. L. Bauer). Mason County: nr. Lake Cushman, V-23-59, 1 (R. Cheyne); VI-1-60, 4♂ 2♀ (D. Carney); VI-2-61, 3♂ 1♀ (D. Carney). Berce County: Longmire Spgs., 2500', VI-19-19, 1♀ (C. L. Fox). CAS. Snohomish County: Yukon Park, Stevens Pass Highway, VI-6-41, 1♀ (D. Carney).